

LINKING MAINE'S LEARNING RESULTS

Secondary
SCIENCE

Name _____

School _____

Town _____

Grade _____

Phone _____

LEARNING RESULTS			DEGREE OF MATCH	0=no link 1=weak link 2=good link 3=strong link
A.	CLASSIFYING LIFE FORMS Students will understand that there are similarities within the diversity of all living things. Students will be able to:			
A1.	Explain the role of DNA in resolving questions of relationship and evolutionary change.			
A2.	Describe similarities and differences among organisms within each level of the taxonomic system for classifying organisms (kingdom through species).			
A3.	Analyze the basic characteristics of living things, including their need for food, water, and gases and the ability to reproduce.			
B.	ECOLOGY Students will understand how living things depend on one another and on non-living aspects of the environment. Students will be able to:			
B1.	Illustrate the cycles of matter in the environment and explain their interrelationships.			
B2.	Compare the process of photosynthesis and respiration, and describe the factors that effect them.			
B3.	Analyze the factors that affect population size (e.g., reproductive and survival rates).			
B4.	Compare the process of photosynthesis and respiration, and describe the factors that effect them.			
C.	CELLS			

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	Students will understand that cells are the basic units of life. Students will be able to:			
C1.	Relate the parts of a cell to its function.			
C2.	Illustrate how cells replicate and transmit information, including the roles of DNA and RNA.			
C3.	Discuss the function of the important "molecules of life" proteins (including enzymes and hormones), carbohydrates, lipids, and nucleic acids.			
C4.	Explain how the human body protects itself against disease and how the body might lose that ability.			
C5.	Analyze and debate basic principles of genetic engineering: how it is done, its uses, and some ethical implications.			
D.	CONTINUITY AND CHANGE Students will understand the basis for all life and that all living things change over time. Students will be able to:			
D1.	Explain how mutations can be caused by gene mutation or chromosomal alteration and describe the possible results of such mutations on individuals or populations.			
D2.	Describe why the offspring of sexually reproducing species have different survival rates than those of asexually reproducing species under a variety of conditions. Describe the advantages and disadvantages of each.			
D3.	Explain and document the importance of relatively short term changes (ex. one generation) on a species' survival.			
D4.	Describe how genetic manipulation can cause unusually rapid changes in species.			
D5.	Compare and contrast fertilization, zygote formation, and embryo development in humans and other species.			

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D6.	Analyze a theory scientists use to explain the origin of life.			
D7.	Explain both the evidence used to develop the geologic time scale and why an awareness of geologic time is important to an understanding of the process of change in the universe as well as on earth.			
E.	STRUCTURE OF MATTER Students will understand the structure of matter and the changes it can undergo. Students will be able to:			
E1.	Trace the development of models of the atom to the present and describe how each model reflects the scientific understanding of their time.			
E2.	Analyze how matter is affected by changes in temperature, pressure, and volume.			
E3.	Describe the characteristics and behavior of acids and bases.			
E4.	Describe an application of the Law of Conservation of Matter.			
E5.	Describe how atoms are joined by chemical bonding.			
E6.	Compare the physical and chemical characteristics of elements.			
E7.	Describe nuclear reactions, including fusion, fission, and decay, their occurrences in nature, and how they can be used by humans.			
F.	THE EARTH Students will gain knowledge about the earth and the processes that change it. Students will be able to:			

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F1.	Describe how air pressure, temperature, and moisture interact to cause changes in the weather.			
F2.	Analyze potential effects of changes in the earth's oceans and atmosphere.			
F3.	Describe the impact of plate movement and erosion on the rock cycle.			
F4.	Describe ways that scientists measure long periods of time and determine the age of very old objects.			
F5.	Demonstrate how rocks and minerals are used to determine geologic history.			
F6.	Analyze the changes in continental position and the evidence that supports the concept of tectonic plates.			
G.	THE UNIVERSE Students will gain knowledge about the universe and how humans have learned about it, and about the principles upon which it operates. Students will be able to:			
G1.	Describe how scientists gather data about the universe.			
G2.	Research current explanations for phenomena such as black holes and quasars.			
G3.	Explain how astronomers measure interstellar distances.			
H.	ENERGY Students will understand concepts of energy. Students will be able to:			

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H1.	Analyze the evidence that leads scientists to conclude that light behaves somewhat like a wave and somewhat like a particle.			
H2.	Examine and describe how light is reflected and refracted (deflected) by mirrors and lenses.			
H3.	Explain or demonstrate how sound waves travel.			
H4.	Analyze the relationship between the kinetic and potential energy of a falling object.			
H5.	Use mathematics to describe the work and power in a system.			
H6.	Describe the relationship between matter and energy and how matter releases energy through the processes of nuclear fission and fusion.			
H7.	Use mathematics to describe and predict electrical and magnetic activity (e.g., current, resistance, voltage).			
H8.	Compare and contrast how conductors, semiconductors, and superconductors work and describe their present and potential uses.			
H9.	Demonstrate an understanding that energy can be found in chemical bonds and can be used when it is released from those bonds.			
I.	MOTION Students will understand the motion of objects and how forces can change that motion. Students will be able to:			
I1.	Use mathematics to describe the law of conservation of momentum.			
I2.	Explain some current theories of gravitational force.			
I3.	Use Newton's Laws to qualitatively and quantitatively describe the motion of objects.			

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I4.	Describe how forces affect fluids (e.g., air and water).			
I5.	Explain the relationship between temperature, heat, and molecular motion.			
I6.	Describe how forces within and between atoms affect their behavior and the properties of matter.			
J.	INQUIRY AND PROBLEM SOLVING Students will apply inquiry and problem-solving approaches in science and technology. Students will be able to:			
J1.	Make accurate observations using appropriate tools and units of measure.			
J2.	Verify, evaluate, and use results in a purposeful way. This includes analyzing and interpreting data, making predictions based on observed patterns, testing solutions against the original problem conditions, and formulating additional questions.			
J3.	Demonstrate the ability to use scientific inquiry and technological method with short term and long term investigations, recognizing that there is more than one way to solve a problem. Demonstrate knowledge of when to try different strategies.			
J4.	Design and construct a device to perform a specific function, then redesign for improvement (e.g., performance, cost).			
K.	SCIENTIFIC REASONING Students will learn to formulate and justify ideas and to make informed decisions. Students will be able to:			
K1.	Judge the accuracy of alternative explanations by identifying the evidence necessary to support them.			
K2.	Explain why agreement among people does not make an argument valid.			
K3.	Develop generalizations based on observations.			

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K4.	Determine when there is a need to revise studies in order to improve their validity through better sampling, controls or data analysis techniques.			
K5.	Produce inductive and deductive arguments to support conjecture.			
K6.	Analyze situations where more than one logical conclusion can be drawn.			
L.	COMMUNICATION Students will communicate effectively in the application of science and technology. Students will be able to:			
L1.	Analyze research or other literature for accuracy in the design and findings of experiments.			
L2.	Use journals and self-assessment to describe and analyze scientific and technological experiences and to reflect on problem-solving processes.			
L3.	Make and use appropriate symbols, pictures, diagrams, scale drawings, and models to represent and simplify real-life situations and to solve problems.			
L4.	Employ graphs, tables, and maps in making arguments and drawing conclusions.			
L5.	Critique models, stating how they do and do not effectively represent the real phenomenon.			
L6.	Evaluate the communication capabilities of new kinds of media (e.g., cameras with computer disks instead of film).			
L7.	Use computers to organize data, generate models, and do research for problem solving.			
L8.	Engage in a debate, on a scientific issue, where both points of view are based on the same set of information.			
M.	IMPLICATIONS OF SCIENCE AND TECHNOLOGY			

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	Students will understand the historical, social, economic, environmental, and ethical implications of science and technology. Students will be able to:			
M1.	Examine the impact of political decisions on science and technology.			
M2.	Demonstrate the importance of resource management, controlling environmental impacts, and maintaining natural ecosystems.			
M3.	Evaluate the ethical use or introduction of new scientific or technological developments.			
M4.	Analyze the impacts of various scientific and technological developments.			
M5.	Examine the historical relationships between prevailing cultural beliefs and breakthroughs in science and technology.			
M6.	Research issues that illustrate the effects of technological imbalances and suggest some solutions.			